



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/784,898	02/16/2001	Lloyd Steven White	W9494-01	4417

7590

06/23/2003

Beverly J. Artale  
W. R. Grace & Co.-Conn.  
Patent Dept.  
7500 Grace Drive  
Columbia, MD 21044-4098

EXAMINER

GRIFFIN, WALTER DEAN

ART UNIT

PAPER NUMBER

1764

DATE MAILED: 06/23/2003

13

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/784,898

Applicant(s)

WHITE ET AL.

Examiner

Walter D. Griffin

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 25 April 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 24-77,79-81 and 83-85 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 42-59,80 and 84 is/are allowed.
- 6) ☒ Claim(s) 24-41,60-77,79,81,83 and 85 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 8.
- ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other:

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114.

Applicant's submission filed on April 25, 2003 has been entered.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 24, 36, 60, and 72 are rejected under 35 U.S.C. 102(b) as being anticipated by Sweet et al. (US 5,643,442).

The Sweet reference discloses a process for removing sulfur compounds from a hydrocarbon stream such as a gasoline stream (i.e., naphtha). The process comprises subjecting the hydrocarbon stream to a membrane separation step preferably at pervaporation conditions. The membrane separation unit selectively removes aromatics from non-aromatics thereby producing a first aromatics-rich permeate stream and a first aromatics-lean retentate stream. The

Art Unit: 1764

aromatics that are selectively removed include sulfur-containing aromatic compounds. The permeated stream also contains significant quantities of co-permeated non-aromatics.

Membranes that can be used in the process include polyurea/urethane membranes and polyurethane imide membranes. The polyimide membranes claimed in claim 24 are interpreted to include any membranes with an imide group. Therefore, the examiner interprets the Sweet reference as disclosing the claimed polyimide membrane. The permeate stream is further treated by hydrotreating to reduce the sulfur content of the permeate stream. Example 2 indicates sulfur enrichment factors as defined in the present specification and sulfur amounts in the retentate stream that are within the claimed ranges. Retentate yield is also within the claimed ranges. See col. 1, lines 31-57; col. 3, lines 49-65; col. 4, lines 40-49; col. 5, lines 17-20; col. 6, lines 32-35; col. 7, lines 47-60; Example 2; and claim 1.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

Art Unit: 1764

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 25-35, 39-41, 61-71, 75-77, 79, 81, 83, and 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sweet et al. (US 5,643,442).

The Sweet reference discloses a process for removing sulfur compounds from a hydrocarbon stream such as a gasoline stream (i.e., naphtha). The process comprises subjecting the hydrocarbon stream to a membrane separation step preferably at pervaporation conditions. The membrane separation unit selectively removes aromatics from non-aromatics thereby producing a first aromatics-rich permeate stream and a first aromatics-lean retentate stream. The aromatics that are selectively removed include sulfur-containing aromatic compounds. The permeated stream also contains significant quantities of co-permeated non-aromatics. Membranes that can be used in the process include polyurea/urethane membranes and polyurethane imide membranes. The polyimide membranes claimed in claim 24 are interpreted to include any membranes with an imide group. Therefore, the examiner interprets the Sweet reference as disclosing the claimed polyimide membrane. The permeate stream is further treated by hydrotreating to reduce the sulfur content of the permeate stream. Example 2 indicates sulfur enrichment factors as defined in the present specification and sulfur amounts in the retentate stream that are within the claimed ranges. Retentate yield is also within the claimed ranges. See

Art Unit: 1764

col. 1, lines 31-57; col. 3, lines 49-65; col. 4, lines 40-49; col. 5, lines 17-20; col. 6, lines 32-35; col. 7, lines 47-60; Example 2; and claim 1.

While the Sweet reference individually discloses the use of the claimed membranes and the sulfur enrichment factors, sulfur content of the retentate, and yield of retentate, the reference does not specifically disclose the claimed membranes in combination with these other factors. The Sweet reference also does not disclose all the claimed feeds, the olefin content of the retentate or the combining of the fractions.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Sweet by utilizing the claimed membranes to achieve the sulfur enrichment factors, sulfur content of the retentate, and yield of the retentate because Sweet discloses these factors for other membranes that are considered to be equivalent of the claimed membranes. Therefore, one having ordinary skill in the art would be led to utilize the claimed membranes to achieve the same results as in the examples of Sweet because these results are desirable.

It also would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Sweet by utilizing the claimed feeds because they are chemically and physically similar to those disclosed and therefore would be expected to be effectively treated in the disclosed process. By utilizing the claimed feeds in the disclosed process, the olefin content in the retentate would be within the claimed ranges.

It also would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Sweet by combining the fractions because

Art Unit: 1764

each fraction is desulfurized and contains similar components. Therefore, combining the fraction results in a total product that can be used for any desired purpose.

Claims 37 and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over as Sweet et al. (US 5,643,442) applied to claims 24 and 60 above, and further in view of Khare (US 6,274,533).

As discussed above, the Sweet reference does not disclose an adsorption process as the non-membrane sulfur reduction process.

The Khare reference discloses a process in which sulfur compounds are removed from a hydrocarbon by contacting the hydrocarbon with an adsorbent. See col. 3, lines 13-25.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Sweet by substituting the adsorption process of Khare for the hydrotreatment of Sweet because these two processes perform the equivalent function of desulfurization and the adsorption process has the additional advantage of retaining olefin content in the hydrocarbon.

Claims 38 and 74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sweet et al. (US 5,643,442) as applied to claims 24 and 60 above, and further in view of Podrebarac et al. (US 6,303,020).

As discussed above, the Sweet reference does not disclose a catalytic distillation process as the non-membrane sulfur reduction process.

The Podrebarac reference discloses a process in which sulfur compounds are removed from a hydrocarbon in a catalytic distillation process. See col. 3, lines 31-55.

Art Unit: 1764

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Sweet by substituting the catalytic distillation process of Podrebarac for the hydrotreatment of Sweet because these two processes perform the equivalent function of desulfurization and the catalytic distillation process has the additional advantage of maintaining olefin content in the hydrocarbon.

*Allowable Subject Matter*

Claims 42-59, 80, and 84 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record does not disclose or suggest a process as claimed in which a polysiloxane membrane is used.

*Conclusion*

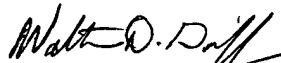
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter D. Griffin whose telephone number is 703-305-3774. The examiner can normally be reached on Monday-Friday 6:30 to 4:00 with alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 703-308-6824. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.



Art Unit: 1764

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0651.

A handwritten signature in black ink, appearing to read "Walter D. Griffin".

Walter D. Griffin  
Primary Examiner  
Art Unit 1764

WG

June 19, 2003